2024-25 CTL/ASSETT Faculty Fellows Project Report

PLAN 2100 Studio (Foundations of Sustainable Planning & Urban Design)
AI for Effective Engagement and XR for Design Scenarios

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Summary

The revision of PLAN 2100 encompassed a complete revision of the use of technology to enhance students experience and align the learning outcomes with the industry standards in urban planning practices and applications of contemporary urban design. The revision included integrating several digital platforms in the studio pedagogy. To facilitate this transformation in curriculum enhancement and students learning experience, collaboration with two CU units (Institute of Cognitive Science and Immersive Media Lab) was pursued. Additional guest speakers from the City of Denver, urban planning firms as well as urban planners and ecological planning experts from academia were invited as guest speakers and studio critics. At the studio concludes, I measured students' outcomes using different tools including grading scale (percent of students who met the evaluation rubrics), feedback from students on the enhancement, using qualitative data from the FCQ survey and an informal discussion with students on the final presentation day. Analysis of the feedback will be highlighted in the results and lessons learned sections of this report.

Why

Transformation of urban planning and urban design education using advanced technology for planning scenarios and placemaking helps prepare students for the job market. It equips them with a mix of skills and technological know-how to tackle the very complex and technically challenging real-world problems, including climate adaptation and resilient community planning. Continuous improvement of our pedagogical approaches in the 21st century is a necessity not a luxury. I see a value in dynamic instruction tools that change and adapt to align with the needs of the profession and prepare students for the competitive job market. Pedagogical innovations help to align new technologies and their applications in the fields of studies and subjects covered in each instructional module. Instructional methods also need to be enhanced through integrating methods that best reach students of diverse backgrounds and ability, so we can prepare our students for the future. ASSETT Fellow Program was a vehicle to engage in a discourse with fellow faculty from across the campus to address the best practices and lessons learned from technology integration into our instructional methods. It helped to emphasize the importance of continuous improvement of studio instructions and to focus on student-centered and active learning methods in all course modules. Along with this shift, carefully revised modules integrated new and innovative technology in teaching and hands-on learning and experimenting.

The project is very critical to the advancement of studio teaching at the Program in Environmental Design and it aligns classroom instructions with the practices of urban planning, sustainability, and urban design. The 3D virtual and mixed reality tools provided a new interactive scenario planning experience, where students and guests were able to walk through the re-envisioned neighborhood blocks and streets.

Challenges

The enhancement of a foundations studio represents a main challenge because of the required contents of fundamentals of urban planning policies and regulations and urban design principles. Training students in advanced technology for area mapping, data analysis and manipulation, and mixed-reality modeling required several tutorials and lab instructions, which not only requires time, but also instructional lab space. This challenge was mitigated through reserving the computer lab for some of these instructions, which were scheduled during the studio time. However, several tutorials were posted as instructional videos on Canvas to offer a self-paced flexible learning experience. Another challenge includes training students in navigating the 3D virtual reality devices and the software required to create an immersive environment for their own designs. Support from the Immersive Media Lab (IML) helped to train students during the last four weeks of studio to release stress and ease the experience of dealing with new software and devices. Finally, dealing with a new AI tool, where students could train the CoBI system by developing their own engagement metrics, was a challenge that was also mitigated through the help of Thomas Breideband, associate director of the Institute for Cognitive Science.
The resulting experience was that integrating multiple technology platforms in studio instructions of this foundation's studio expanded the students' experience and preparedness for the job market.

Project Results

The project resulted in a well-designed pedagogy that balances the fundamentals of sustainable urban planning and urban design with training on hands-on utilization of advanced technology in planning and design practices. It also led to a successful experience for the students and myself, particularly the experience of sharing an early proposal draft with my ASSETT Fellow cohort and program admins, who shared invaluable and constructive feedback. Students' qualitative feedback in the FCQ survey will also be taken into consideration for next year's course offering.

Despite time management challenges -due to time spent on tutorial and training on software and devices- the studio outcomes helped to advance students technical and analytical skills and to be fully engaged in workshops for urbanization, sustainable development and resilient planning. The results included the following professional planning deliverables:

- High quality visuals of redevelopment scenarios of four neighborhoods in Denver (Cherry Creek, Highland, South Park Hill, and Lincoln Park.
- Advanced data sharing visuals -using Esri StoryMap- for the site's redevelopment strategy in alignment with Denver comprehensive plan.
- Data-driven resilience and environmental and social sustainability features and community resilience.
- Fully developed 3D models that were navigated through 3D headsets to emulate community participation in the design and planning process.

Project Description

My project, a technological enhancement and active learning in the pedagogy of PLAN 2100, encompassed redesigning the studio modules and project to allow for effective engagement in the planning process of four Denver neighborhoods. The redesign of the studio structure included

seven modules starting with addressing definitions and best practices in sustainable urban planning and resilient community design to address current zoning regulations and specific codes, exploring technology for map making and geospatial analysis, to data sharing and visualization and the immersive environment for navigating the redesigned neighborhoods.

The studio revisions included the following redesigned modules:

<table>
<tr><td>Module 1 (3W)</td><td>Definitions & Best Practices</td><td>Module 5 (2W)</td><td>Design & Performance</td></tr>
<tr><td>Module 2 (2W)</td><td>Tools and Metrics:
ArcGIS Pro tutorials +
StoryMap demo</td><td rowspan="2">Module 6 (3W)</td><td rowspan="2">Final Design
Digital 3D models</td></tr>
<tr><td>Module 3 (1W)</td><td>Zoning & Codes</td></tr>
<tr><td>Module 4 (2W)</td><td>Visioning & Conceptual Design (Role Play + CoBI AI tool) in collaboration with Institute of Cognitive Science</td><td>Module 7 (3W)</td><td>XR Model + Meat Quest headset for navigation, in collaboration with Immersive Media Lab
Final submission</td></tr>
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Primary revisions covered the following components:

1) Developed self-pace Geographic Information Systems (GIS) tutorials for map analysis.
2) Engagement -via active learning- in a one-week workshop series to apply CoBI AI tool engagement in the development early vision and for measuring effective participation.
3) Use of ArcGIS Pro to develop area maps and geospatial analysis of neighborhood's accessibility and amenities.
4) Use of Esri StoryMap to compile the history and proposed redesign of the neighborhoods.
5) Creating Virtual Reality (VR) and Augmented Reality (AR) models for immersive learning experience to navigate the redesigned neighborhoods

Outcomes

What worked

What really worked in this studio revision is the multitude of technological platforms integrated in teaching and experimentation of planning scenarios and effective engagement. The innovative and exploratory tools and online platforms utilized to address the impact of climate change on development strategies in the Midwest region, where the City of Denver is located, was also a successful improvement in the course instruction methods. Below are the measures for what worked in this studio revision:

1) Preparing students for careers in sustainability research, urban planning, and urban design.
2) Collaborate with existing technology infrastructure across campus and beyond to introduce immersive environment for urban planning scenarios and for measuring effective community engagement in the visioning workshop.
3) Engage with professionals in the field (6 guest speakers from industry, City of Denver, and CU Boulder visited the studio and engaged in Work collaboratively with faculty and professionals to integrate their feedback in the project
4) Enhance student engagement and active learning.
5) Train students on several interactive VR/AR devices and digital performance measures in sustainable planning and urban design.

What didn't work

In this first iteration of studio revision, and due to time limitation and the need to allocate portions of the studio-allotted lecturing time, it was not possible to integrate parameters for using Generative AI (using ChatGPT) into the final report writing. More time is needed in the next iteration of this studio improvement to develop proper guidelines that meet the best practices guidelines for AI in written assignments. The guidelines should carefully address the possibility and limitation of using ChatGPT or other platforms in idea's creation, writing suggestions, essay feedback, and as a research tool. A rubric for valuating students' usage and work improvement using these platforms will be needed in the next iteration of this studio instructions.

Lessons learned

Some of the important lessons learned from this one-year course revision experience is to plan the enhancement in phases that would take two to three years for full implementation. Designing a rigorous assessment tool for each phase is also important and will complement the feedback gathered from FCQ surveys administered for all courses at CU Boulder.

Reflection

I was so fortunate to be accepted into the ASSETT Fellow Program in my first year at CU Boulder. Working with the program administrators and the cohort of faculty fellows from different STEM, Social Science, and Liberal Arts disciplines enhanced my experience and offered effective peer-feedback and powerful discourse for instructional improvement. The program also provided me with a great opportunity to join a collaborative network of faculty that share their common goals of transforming educational experience into a model of excellence in education that advances the integration of technology in the classroom. This was particularly helpful in my first year at CU Boulder, as I transitioned to a new campus. Specifically, in my area -sustainable planning and urban design- such a network of faculty and campus resources helped me to advocate for/and lead by example the vision for transforming current teaching model into an enhanced, tech-driven, instructions and students' engagement. I have also partnered with a former ASSETT Fellow from my ENVD Program, Emily Greenwood, to present to our department our experience in integrating standard technology in planning studio and history lectures, which provided a great perspective on the value and impact of the Fellow Program in our areas of teaching.

The following quotes are excerpts from the FCQ qualitative data for this studio:

> *"The VR thing is so cool; I really do love it. Thanks for the great studio!"*
>
> *"I thoroughly enjoyed this PLAN 2100 course with Azza. There was sufficient balance between individual precedent analysis assignments and the group design work. The major design project we undertook was an outstanding one and should be continued."*
>
> *"This course was enjoyable and a good full-on intro into urban planning."*
>
> *"I really loved this class. It really helped me work with groups, and I feel like I came out of it as a much better planner."*
>
> *"I enjoyed everything that we learned, and I liked the use of technology in the course."*

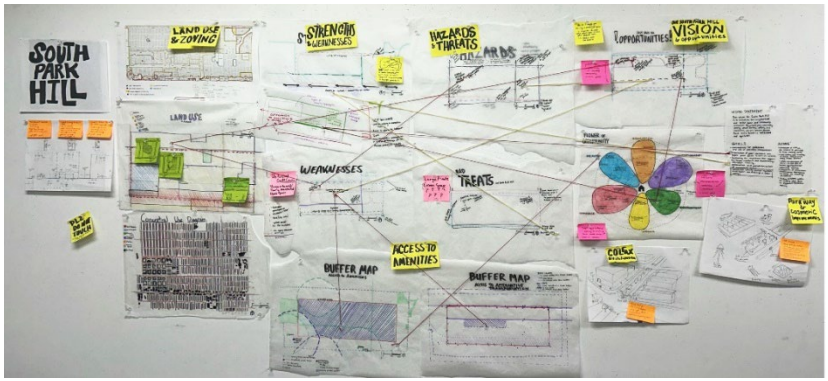
Supplemental Materials

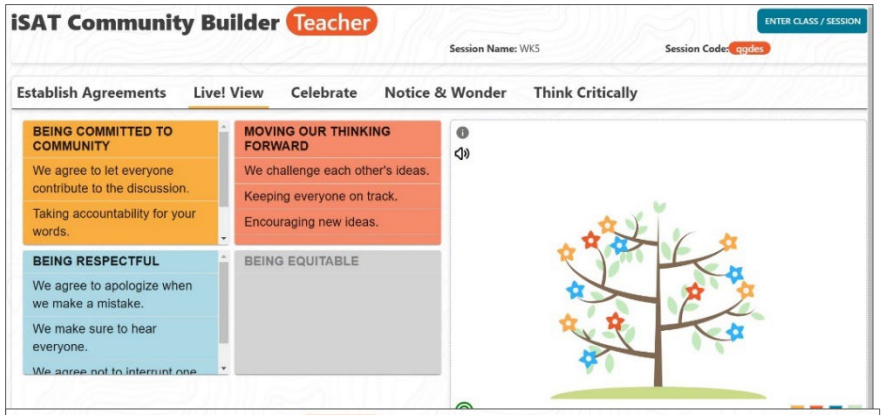
Examples of CoBI AI tool application in the engagement -Role Play- sessions and the XR models' navigation are shown in the next two pages.

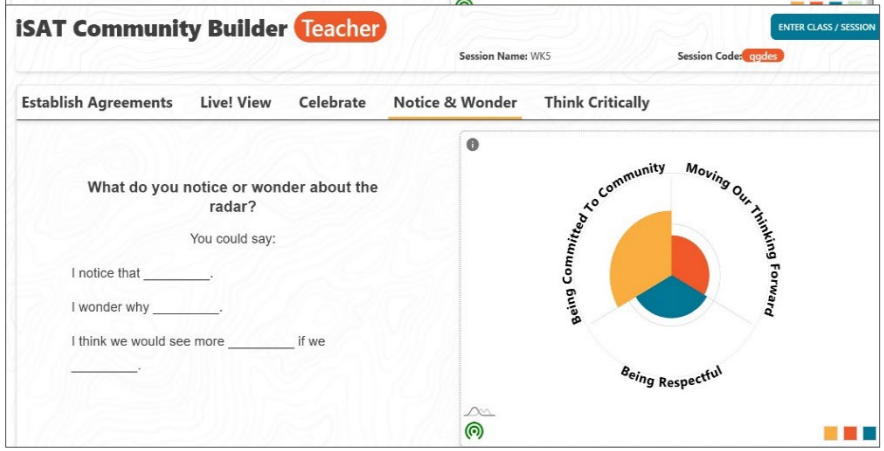
ROLE PLAY (CoBI AI) Tool

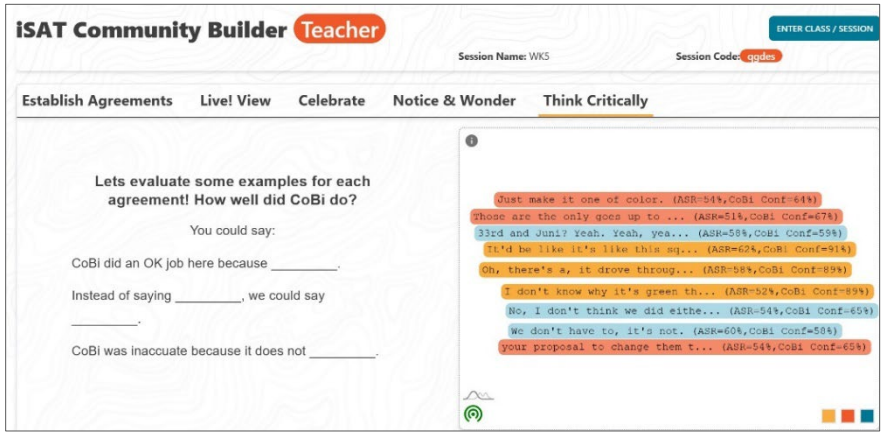
In collaboration with CU Boulder Institute for Cognitive Science, I was able to integrate an Artificial Intelligence (AI) tool, known as the Community Design (CoBI). The Tools utilize three parameters to measure effective engagement and group work. Students define the rubrics that measure each parameter at the beginning of the engagement workshops, which lasted for three consecutive studio meetings (Monday, Wednesday, and Friday). The parameters include:

1) Being committed to community,
2) Moving thinking forward, and
3) Being respectful.









IMMERSIVE ENVIRONMENT

Mixed-Reality (XR) Scenario Planning

The final models developed by students focused on Denver neighborhoods were redesigned for resilience and sustainable urbanism. Redesigned neighborhoods aligned with the new parking minimum regulations, maximized density, and mixed-income housing. The redesigned neighborhoods were produced in digital format using SketchUp software, and were navigated by students, jurors, and studio guests using Meta Quest 3 headset. The devices were accessible through collaboration with CU Boulder Immersive Media Lab.